

## CLAIMS:

1. A method of producing calcium silicate hydrate comprising contacting calcareous material with siliceous material in an aqueous environment under elevated temperature and pressure and for a sufficient time to permit the calcareous material and  
5 siliceous material to react and form calcium silicate hydrate, wherein  
prior to said reaction, a predetermined quantity of a suspension agent is added to permit said reaction to take place with little or no agitation.
2. A method as claimed in claim 1 wherein the calcareous material is mixed with water to form a slurry of slaked lime prior to addition of a suspension agent and/or  
10 siliceous material.
3. A method as claimed in claim 1 or claim 2 wherein the suspension agent is preferably mixed with water to form a slurry prior to being mixed with a calcareous  
and/or siliceous material.
4. A method as claimed in claim 2 or claim 3 wherein the water used to  
15 form at least one of the slurries is preheated.
5. A method as claimed in any one of the previous claims wherein the suspension agent is a gel forming agent adapted to form a gel upon contact with the calcareous material, siliceous material and/or water.
6. A method as claimed in any one of the previous claims wherein the gel  
20 forming agent is a source of amorphous silica.
7. A method as claimed in any one of the previous claims wherein the gel forming agent is selected from the group consisting of diatomaceous earth, clay, silica fume, cellulose pulp or mixtures thereof.
8. A method as claimed in any one of the previous claims wherein the gel  
25 forming agent is combined with a slaked lime slurry, optionally further diluted with water, and allowed to react to form a gel, and subsequently combined with the siliceous material and subjected to elevated temperature and pressure to form calcium silicate hydrate.
9. A method as claimed in any one of the previous claims wherein the siliceous material is combined with the calcareous material and suspension agent in a dry  
30 powdered state or as a slurry.

10. A method as claimed in any one of claims 7 to 9 wherein the siliceous material is mixed into the gel to provide an essentially homogeneous reactive mixture.
11. A calcium silicate hydrate with a post reaction solids content of greater than 35%wt.
- 5 12. A method as claimed in claim 11 having a post reaction solids content between 35% to 60%wt.
13. A calcium silicate hydrate as claimed in claim 11 wherein about stoichiometric quantities of calcareous material and siliceous material are reacted to form the calcium silicate hydrate such that the resultant product has a bulk density of around 120 to  
10 200 kg/m<sup>3</sup>.
14. A calcium silicate hydrate as claimed in claim 11 wherein excess silica is added to the calcareous and siliceous reactants such that the resultant product has a bulk density of up to about 380 to 460 kg/m<sup>3</sup>.
15. A calcium silicate hydrate as claimed in any one of claims 11 to 14 and  
15 produced according to the method of any one of claims 1 to 10.
16. The use of a gel in the manufacture of calcium silicate hydrate, said gel being formed by combining a calcareous slurry with a gel forming agent over a predetermined temperature/pressure profile, the gel having a consistency such that upon combination with a siliceous material, the siliceous material is suspended therein for  
20 subsequent reaction with the gel at elevated pressure and temperature to form calcium silicate hydrate, without the need for mixing or agitation.
17. The use of a gel as claimed in claim 16 wherein the gel forming agent is a source of amorphous silica.
18. The use of a gel as claimed in claim 16 or claim 17 wherein the gel  
25 forming agent is selected from the group consisting of diatomaceous earth, clay, silica fume, cellulose pulp or mixtures thereof.
19. The use of a gel as claimed in any one of claims 16 to 18 wherein the siliceous material is mixed into the gel to provide an essentially homogeneous reactive mixture.
- 30 20. The use of a gel as claimed in any one of claims 16 to 19 wherein the siliceous material is combined with the gel in a dry powdered state or as a slurry.

21. A reactable matrix comprising a calcareous gel with a homogeneous distribution of siliceous material suspended therethrough and adapted to be subjected to elevated temperature and pressure and permit reaction between the calcareous gel and siliceous material to form calcium silicate hydrate.
- 5 22. A reactable maxtrix as claimed in claim 21 wherein the calcareous gel is produced by combining a calcareous material with a gel forming agent, optionally diluted with water and allowed to react to form a gel.
23. A reactable matrix as claimed in claim 21 or claim 22 wherein the siliceous material is mixed into the gel to provide an essentially homogeneous reactable  
10 matrix.
24. A reactable matrix as claimed in claims 21 to 23 wherein the siliceous material is combined with a calcareous gel in a dry powdered state or as a slurry.
25. The use of a suspension agent in the manufacture of calcium silicate hydrate, the suspension agent being combined in sufficient quantities with a calcareous  
15 material and a siliceous material to maintain said components in suspension and thereby permit reaction between said materials without the need for mixing or agitation.
26. A method as claimed in claim 25 wherein the calcareous material is mixed with water to form a slurry of slaked lime prior to addition of a suspension agent and/or siliceous material.
- 20 27. A method as claimed in claim 25 or claim 26 wherein the suspension agent is preferably mixed with water to form a slurry prior to being mixed with a calcareous and/or siliceous material.
28. A method as claimed in claim 26 or claim 27 wherein the water used to form at least one of the slurries is preheated.
- 25 29. A method as claimed in any one of claims 26 to 28 wherein the suspension agent is a gel forming agent adapted to form a gel upon contact with the calcareous material, siliceous material and/or water.
30. A method as claimed in any one of claims 26 to 29 wherein the gel forming agent is a source of amorphous silica.

31. A method as claimed in any one of claims 26 to 30 wherein the gel forming agent is selected from the group consisting of diatomaceous earth, clay, silica fume, cellulose pulp or mixtures thereof.

32. A method as claimed in any one of claims 26 to 31 wherein the gel  
5 forming agent is combined with a slaked lime slurry, optionally further diluted with water, and allowed to react to form a gel which is subsequently combined with the siliceous material and subjected to elevated temperature and pressure to form calcium silicate hydrate.

33. A method as claimed in any one of claims 26 to wherein the siliceous  
10 material is combined with a calcareous material and suspension agent in a dry powdered state or as a slurry.

34. A method as claimed in any one of claims 31 to 30 wherein the siliceous material is mixed into the gel to provide an essentially homogeneous reactive mixture.